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Evaluation of the Clinical Presentation and MRI Findings to Establish the Specific Cause of Myelopathy

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Abstract: Disease of the spinal cord is called myelopathy. They are frequently devastating. They produce quadriplegia or paraplegia with sensory deficits far beyond the site of damage. Many spinal cord diseases are reversible if recognized and treated at an early stage. The aim of this study was to evaluate clinical presentation and aetiology of myelopathy among the patients attending Rajshahi Medical College Hospital with the help of history, clinical examination and investigations. This was a cross-sectional type of descriptive study. A total 44 myelopathic patients were evaluated during study period. Out of 44 patients, 33 (75%) were male and 11 (25%) were female (ratio 3:1), mean aged 35±13.9 years (range 13-65 years). Among them 24 (54.35%) patients had paraparesis and 20 (45.5%) patients had quadriparesis? It was observed that majority 33 (75%) of them had compressive type and 11 (25%) patients had non-compressive type of involvement and out of 33 compressive type of involvement. Out o f33 compressive myelopathy, the commonest cause was CSM 14 (42.4%). 2nd cause was Pott's disease 8 (24.2%) in number5. Syringomyelia was detected in 5 (11.4%) patients. disc herniatation was n 2 (6.1%) patients. schwannoma was in 2 (6.1%) patients, lipoma was in 1 (3%) patient was metastasis to the vertebra. Out of 11 non-compressive myelopathy ATM was detected in m9 (81.8%) patients and familial spastic paraplegia in 2 (18.2%) patients. All patients with myelopathy should be investigated for potentially treatable causes.
Keywords: Clinical, Aetiology, Myelopathy, Spinal Cord Diseases.

INTRODUCTION

Diseases of the spinal cord are called myelopathy. They are frequently devastating and produce quadriplegia or paraplegia with sensory deficits far beyond the site of damage. The spinal cord is a compact structure in which all the ascending and descending tracts are concentrated within an area having a diameter of 17 to 18 mm. Any disease affecting the cord will therefore affect all or most of the structures within this small area. The ascending tracts carry information from outside and inside the body to the brain while the descending tracts facilitate the activities of the lower motor neuron by carrying information from the brain. The important ascending tracts are the anterior and lateral spin thalamic tracts, the posterior columns, the spinocerebellar and the spino tectal, reticular and olivary tracts, the important descending tracts are the major corticospinal tracts, and the reticulo, tecto, rubro, vestibulo, and olivospinal tracts and some descending autonomic fibers.

Diseases of the spinal cord affect the ascending and descendigntracts to a variable degree depending on the nature of the involvement. The corticospinal tracts are the fivers involved with controlling the voluntary motor activities. The autonomic fibers are involved with control of visceral and sphincteric activities. The other descending fibers are concerned with maintaining balance, posture, and integrating the activities of the extensor and flexor groups of muscles so that voluntary motor activity is carried out in a smooth and well co-ordinated fashion. Any pathology of these tracts will therefore affect the normal motor activities. Patient will complain of weakness and inability to perform motor

functions and there will be loss of balance and posture. Descending autonomic fiber involvement affects the sphincter functions. Loss o fsphincteric function affects the patient most and is responsible for causing major disability to the patient. Loss of Sphincter function unless treated early remains permanent problem. So to prevent this catastrophic disability early treatment of the cause of the myelopathy is a must. Thus loss of sphincter functions is a Myelopathic neurosurgical emergency.

Affection of the ascending tracts blocks the passage of sensory information to the brain. There is loss of sensation below the affected region and the sensory loss depends of the different tracts carrying the various modalities of sensation. Thus a spinal cord lesion affecting mostly maintaining the posture and balance of the body, information from the joints and other peripheral sencory ortgans must travel to the brain, Affection of these pathways will thus affect posture and balance also. Sphincter function is maintained by both afferent and efferent fibres to the sphincters. So ascending autonomic involvement will also affect the sphincteric functions and early correction is essential to revive the sphincter function.

Myelopathy is thus a catastrophic condition which affects ass aspects of the normal functioning of the human body. Motor, sensory and autonomic function is all affected to a variable degree in diseases of the spinal cord. So the sine qua non of a myelopathic disease is:

- motor weakness,
- sensory impairment, with a definite anatomical level, and
- loss of sphincteric function.

The spinal cord is a fine structure whose proper functioning depends upon an exquisite balance of proper anatomical and physiologic activities of the body. Any disruption affecting the spinal cord will cause a pathological disturbance in the proper functions of the cord. Thus common disorders affection the spinal cords are:

- Compressive;
- Vascular;
- Inflammatory;
- Infectious;
- Developmental
- Metabolic [5]

Common case of myelopathy in developing countries where TB is prevalent endemically is spinal tuberculosis, caused by spinal cord compression due to abscess, granulomatous tissue or bony displacement (Hristea, 2008).

Objective

General Objective

- Analysis of the clinical presentation, MRI findings and establish the principal causes of myelopathy.

Specific objectives

- To find out specific clinical features for specific cause.

METHODOLOGY

Study type

It was a cross-sectional type of descriptive study.

Place of Study

The present study was carried out among the patients reporting to outpatients department and patients admitted into Neuromedicine, Neurosurgery and Medicine units of Rajshahi Medical College Hospital (RMCH).

Period of Study

One year (01-01-09 to 31-12-09).

Sample Size

The required simple size for the proposed study had been calculated by using the following statistical formula.

$$n\frac{z^2 \times p \times q}{d^2}$$

Here p= 6%=0.06 [Reference : On an average daily 6% of myelopathic patients admitted into different Medicine and Neuromedicine ward of RMCH. The prevalence of myelopathic patients has been determined by the consultation with the specialists working in the determined by the consultation with the specialists working in the department of Medicine and Neruomedicnine ward at RMCH]

q = 1-0.06
=0.94

d =5% =0.05; z=1.96 at 95% CI

So, putting the value into above equation

$$=\frac{1.96^2 \times 0.06 \times 0.94}{0.05^2} = 86.66 = 87$$

As the information about the total number of myelopathic patients attending RMCH for a period of six months on an average 60.

So the corrected sample size was as follows.

$$n_c = \frac{n_0}{1+\frac{n_0}{N}} = \frac{87}{1+\frac{87}{60}} = 35.51. = 36$$

Considering 20% dropout or unwillingness to participate or any other unexpected loss during data collection, so the sample size needed to be increased by adding 20% more. Ultimately it was 36+8=44.

Sampling method

The researcher had gone through the Neromodecine, Neurosurgery and Medicine wards and outpatients department of RMCH from the register book maintained in the ward and outdoor. Identification of the participant was done by asking duty doctor or nurse in the ward and participant was done by asking duty doctor or nurse in the ward and outdoor. After identification of the study subject, the researcher explained the aim and objectives of the study to prospective study subject in details. If the respondent agreed to participate then informed written consent was obtained and thereby was included in the study. So the selection of the participants indicated that a non-random sampling technique was applied in this regard. But the researcher selected each study participant on the basis of predetermined inclusion and exclusion criteria.

Inclusion criteria

- Age >12 yrs
- Spastic weakness of one or both lower limbs or all four limbs.
- Flaccid type of paralysis with sensory level or bowel bladder involvement.

Exclusion criteria

- Impaired consciousness.
- cranial nerve involvement
- History of trauma.
- Sign o cerebellar involvement.

Sample collection

The patients who fulfilled both the inclusion and exclusion criteria were enrolled in this study.

METHOD OF DATA COLLECTION

Data were collected by face-to face interview, physical examination and investigations in a data collection sheet. It was collected after taking informed consent of the patient.

STATISTICAL ANALYSIS

The data were analysed with help of SPSS software programme. Descriptive analytical techniques involving frequency distribution, computation of precentage, mean, SD, etc were applied. Association between variable were conducted applying chi-square test.

Ethical Issues

Eligibility of each case was assessed and identified. Every patient and/or responsible family member was asked for informed consent. They were informed about the procedure and the study goal. The patients were also informed that they were free to refuse to participate or to withdraw at any time with without compromising their medical care.

RESULTS

Table-1: Frequency distribution of patient by age and sex. (n=44)

Age groups	Sex				Total	
	Male		Female			
	N	%	N	%	N	%
<20	4	50.0	4	50.0	8	18.2
21-30	11	78.6	3	21.4	14	31.8
31-40	6	100.0	0	00.0	6	13.6
41-50	9	81.8	2	18.2	11	25.0
>51	3	60.0	2	40.0	5	11.4
Total	33	75.0	11	25.0	44	100.0

Regarding frequency distribution of the patients by age and sex, it was revealed that 14 (31.8%) of them were in the age group of 21-30 years. Among them 11 (78.6%) were male and 3 (21.4%) were female patients respectively. It was also found that 11 (25.0%) patients belonged to age group 41-50 years. Among them 9 (81-8%) were male and 2 (18-2%) were females. There were 8 patients aged 20 years or less in the study (Table no. 1).

Table-2: Distribution of patients by occupations. (n=44)

Occupation	Number	Percentage
Farmer	2	4.5
Day labourer	1	2.3
Business	16	36.4
Govt. service	5	11.4
Private Job	1	2.3
Student	8	18.2
House wife	8	18.2
Others	3	6.8
Total	44	100.0

About frequency distribution of patients by occupation, the study showed that 16 (36.4%) patients were businessman. It was also revealed that 8 (18.2%) patients were students and equal percentages. (18.2%) of respondents were housewife. About 5 (11.4%) patients were found in government service and 2 (4.5%) patients were farmers (Table no. 2).

Table-3: Economic condition of the patients. (n=44)

	Frequency	
Economic status	Number	Percentage
Upper>15.001	14	31.8
Middle 10,001-15,000	18	40.9
Lower<10,000	12	27.3
Total	44	100.0

Table no. 3 show the economical condition of the patients. 18 (40.9%) of them belonged to middle income groups in terms of having monthly income of taken 10,001 to 15,000, It was also revealed that 14 (31.8%) patients told of their monthly income more than 15,001 taka. About 12 (27.3%) patients came from low income group with a monthly earning less than Taka 10,000 (Table no. 3).

Table-4: Clinical presentation of patients. (n=44)

	Frequency	
Presentation	Number	%
A. Weakness		
Lower limb	44	100
Upper and lower limb	20	45.5
B.Pain		
Upper limb	7	15.9
Lower limb	5	11.4
Upper and lower limb	0	0
C. Sensory symptoms		
Upper limb	5	11.4
Lower limb	1	2.3
Upper and lower limb	0	0
D. Wasting		
Upper limb	5	11.4
Lower limb	0	0
Upper and lower limb	0	0
E. Urinary retention		
Present	8	18.2
Absent	36	81.8
F. Respiratory difficulty		
Present	0	0
Absent	44	100.0
G. Muscle twitching/Fasciculation		
Present	0	0
Absent	44	100.0
H. Hoffman's sign		
Present	10	22.7
Absent	34	77.3
I. Clonus		
Present	16	36.4
Absent	28	63.6

Table no. 4 shows the frequency distribution of patients by clinical presentation. About the weakness of the limbs, it was found that 44% (100%) patients had weakness in the lower limb. It was also revealed that 20 (45.5%) patients had weakness in both upper and lower limbs. Regarding pain in the limbs, 7 (15.9%) patients reported of pain in upper limb and 11.4% patients told of pain in lower limb. About 11.0% patients informed of sensory symptoms in upper limb. In case of wasting, it was observed that only 5 (11.4%) patients had wasting in the upper limb. Hoffman's sign present in 10 (22.7%) patients and clonus present in 16 (36.4%) patients.

Table-5: Characteristic of gait of the patients. (n=44)

Gait	Frequency	
	Number	Percentage
Normal	7	15.9
Abnormal	19	43.2
Could not be performed	18	40.9
Total	44	100.0

Regarding distribution of patients by characteristics of gait, it was revealed that out of 44 patients, 19 (43.2%) of them had abnormal gait, mostly spastic gait. It was also found that 7 (15.9%) patients had normal gait. The test for gait could no be performed for 18 (40.9%) patients (Table no. 5).

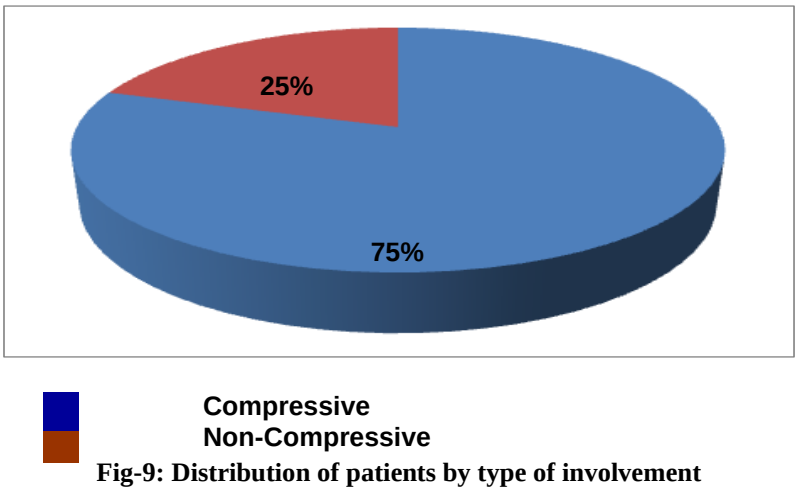

Fig-9: Distribution of patients by type of involvement

About the frequency distribution of patients by type of involvement, it was observed that majority 33 (75.0%) of them had compressive type and 11 (25.0%) patients had non-compressive type of involvement (figure no.9).

Table-6: Distribution of study subjects according to radiological diagnosis. (n=44)

Diagnosis	Frequency	
	Number	Percentage
ATM	9	20.5
CDM	14	31.8
Disc Herniation	2	4.5
Familial Spastic Paraplegia	2	4.5
Lipoma	1	2.3
Metastasis	1	2.3
Pott's	8	18.2
Schwannoma	2	4.5
Syringomyelia	5	11.4
Total	44	100.0

Table no. 6 shows the frequency distribution of study subjects by radiological (x-ray and MRI) diagnosis. It was revealed that 14 (31.8%) patients had CSM. It was also observed that 9 (20.5%) patients had developed ATM, 8 (18.2%) patients had pott's disease. Syringomyelia was detected in 5 (11.4%) patients.

Table-7: Distribution of compressive disease. (n=33)

Diagnosis	Frequency	
	Number	Percentage
CSM	14	42.4
Disc herniation	2	6.1
Lipoma	1	3.0
Metastasis	1	3.0
Pott's	8	24.2
Schwannoma	2	6.1
Syringomyelia	5	15.2
Total	33	100.0

Regarding frequency distribution of patients with compressive type of involvement by disease, it was found that out of 33 compressive myelopatht, 14 (42.4%) had CSM. It was also revealed that 8 (24.2%) patients had pott's disease and 5 (15.2%) patients were detected with syringomyelia.

Table-8: Distribution of patients by age with compressive and non-compressive lesion. (n=44)

Age groups	Type of Myelopathy				Total	
	Compressive		Non- compressive			
	N	%	N	%	N	%
Less than 40 yrs	18	64.3	10	35.7	28	63.6
41 and above	15	93.8	1	6.3	16	36.4
Total	33	75.0	11	25.0	44	100.0

The study showed that out of 44 patients, 28 (63.6%) belonged to age 40 years or less. Among them 18(64.3%) patients had compressive type of myelopathy and 10 (35.7%) patients had non-compressive variety of lesions. It was also founo that 15 (93.8%) patients aged 41 years and above had compressive lesion and only 1 (6.3%) patient had non compressive myelopathy. The study findings indicated that there was statistically significant association between age of the patients and types of myelopathy (X^2 = 4. 714, p=0.03) [Table no.8]

Table-9: Distribution of compressive and non-compressive lesion by sex. (n=44)

Sex	Type of Myelopathy				Total	
	Compressive		Non-compressive			
	N	%	N	%	N	%
Male	26	78.8	7	21.2	33	75.0
Female	7	63.6	4	36.4	11	25.0
Total	33	75.0	11	25.0	44	100.0

Out of 44 patients, 33 (75.0%) patients were male. Among them 26 (78.8%) had compressive and 7 (21.2%) had non-compressive Varity of myelopathy. In case of 11 (25.0%) female patients, 7 (63.6%) had compressive and 4 (36.4%) had non-compressive myelopathy. The association between types of myelopathy and sex is not statistically significant (X^2 =1.01, p=0.315) [Table no. 9]

Table-10: Distribution of common myelopathy by age of the patients, (n=31)

Age groups	Major myelopathy						Total	
	ATM		Pott's		CSM			
	N	%	N	%	N	%	N	%
Less than 40 yrs	9	47.4	3	15.8	7	36.8	19	61.3
41 and above	0	00.0	5	41.7	7	58.3	12	38.7
Total	9	29.0	8	25.8	14	45.2	31	100.0

Regarding frequency distribution of patients by common myelopathy and age, it was found that out of 31, 19 patients belonged belonged to 40 years or less. Among them 9 (47.4%) patients had ATM, 7 (36.8%) patients had CSM and 3 (15.8%) had pott's. In case of 12 (38.7%) patients aged 41 years and above, 7 (58.3%) had CSM and 5 (41.7%) had Pott's disease. The association between common myelopathy and age of the patients was found statistically highly significant (= 8.345, p=0.015) [Table no.10]

Table-11: Distribution of patient by limb involvement. (n=44)

Parameters	Frequency	
	Number	percentage
Para paresis	24	54.5
Quadriparesis	20	45.5
Total	44	100.0

Table no.11 shows the frequency distribution of patients by limb involvemebt. Out of 4 patients, 24 (54.5%) patients had paraparesis and 20 (45.5%) patients had quadriparesis

Table-12: Distribution of patient by site of myelopathy. (n=44)

Parameters	Frequency	
	Number	Percentage
Cervical	18	41
Cervico-thoracic	02	4.5
Thoracic	22	50
Lumbar	00	00
Normal	02	4.5
Total	44	100

The study showed that out of 44 patients, cervical myelopathy was 18 (41%), thoracic myelopathy was 22 (50%) patients. Lesion extend from cervical to thoracic was found in 2 (4.5%) patients. 2 (4.5%) familial spastic paraplegic patients had normal MRI finding.

DISCUSSION

The present study was carried out in Rajshahi Medical College Hospital, Rajshahi. A total number of 44 patients were included in the study. In the present study CSM formed the most common cause of myelopathy comprising31.8% of all patients. Acute transverse myelitis was the next common cause. pott's disease stands in third position. Rest of the conditions producing myelopathies formed a small percentage and included 5 cases of syringomyelia, 2 cases of dise herniation, 2 cases of familial spastic paraplegia, 2 cases of Schwannoma, I case of Lipoma, I case of metastasis to the vertebra. Out of 44 patients compressive myelopathy were 33 (75%) and non-compressive were 11 (25%) in number. Out of 33 compressive myelopathy CSM was 14 (42.4%). Pott's disease 08 (24.2%) syringomyelia 05 (15.2%) Disc herniation 02 (6.1%) schwannoma 02 (6.1%), Lipoma 01 (3%) and Metastasis to the vertebra 01 (3%) in number. These findings may 13 and female was l in number. Out of 14 patients 9 were Businessman, 4 were Govt, service holder and one house wife. Mean age of pott's disease was 43.5 yrs (range 20-60 yrs). all pott's patient had raised ESR (mean 88.12 mm in 1st hour, range 45-120mm. in 1st hour). All patients presented with paraparesis and involvement of thoracic spine. Out of 8 patients of pott's disease, 7 patients had Para vertebral Soft tissue involvement. These findings were consistent with findings observed by page *et al*. 2006.

Two patients were found with single dise herniation without history of trauma. One patient was diagnosed as a metastasis to the vertebra. CT image of chest show an ovoid mass located at the posterior part of mid zone adjacent to pleura in the right lung field. FNAC was done from the mass and features were suggestive of Aden carcinoma. MRI of the dorsal spine reveled destruction with partial collapse of D4 vertebra with paravertebral mass with dorsal cord compression. Out of 44 patients, 5(11.4%) patients were diagnosed as syringomyelia. 3 patients were male and 2 were female. Mean age was 24 yrs (range 19-30 yrs). Schwannoma and lipoma are rare causes of spinal cord compression. we were however able to pick up 2 Schwannoma and 1 Lipoma patients. Lipoma was intradural but extramedullary lesion. 11(25%) patients in this study had non-compressive spinal cord lesions. ATM was the commonest of all. These findings are consistent with that of prabhakar S, 1999, who also found ATM to be the most common form of non-compressive myelopathy. Out of 9 patients of ATM antecedent event was observed in 4 patients (44.4%), febrile illness with upper respiratory illbess was found 3 patients, Chickenpox was present in 1 patient. Out of 9 patients 6 were males and 3 females. The mean age was 22.77 (range 13-40) years. All the patients of ATM were severely disabled with the power in lower limbs at presentation being grade 0-2.ATM is a monophasic illness and one of the important questions to be addressed, while confronted with a patient of ATM, is to differentiate between a post-infectious from an initial presentation of a case of MS as they have different prognostic values. CSF study of ATM patients revealed, mean cell count was 12.8 (range 5-20/cumm of CSF) and mean protein value was 53.3 mg/dl (range 40-60 mg/dl, with normal CSF sugar. Two patients of our study had Familial spastic paraphegia. One of them having positive family history (father affected). MRI of the other spinal cord and MRI of the brain were normal.

CONCLUSION AND RECOMMENDATIONS

Many spinal cord diseases are reversible if recognized and that at an early stage, the efficient use of diagnostic procedures, guided by knowledge of the anatomy and the clinical features of spinal cord disease are required for successful outcome. In the present study almost all of the patients suffering from treatable diseases. Early detection of myelopathy and treat accordingly may prevent disability burden in our country and improve the quality of life. All patients with spinal cord disease should be investigated for potentially treatable causes.

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